ATOMIC ENERGY newsletter

THE FIRST AND ONLY

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Dear Sir:

The largest peacetime U.S. atomic budget yet, the fiscal 1951 atomic fund request, was given Congress last week by President Truman. Funds requested included: development of nuclear reactors, $32,182,700.00; atomic bomb production, research and testing, $143,979,563.00; research laboratory construction, $112,757,695.00; increased production of domestic uranium ores, and their fissionable end-products uranium-235 and plutonium, $138,753,767.00.

Describing the steps firms should take to be considered for Atomic Energy Commission work, a new guide entitled, "Contracting of Construction and Related Engineering Services (by the AEC)" is now available from the Superintendent of Documents, Washington, D.C. (10¢). Lump-sum, fixed-price, and cost-plus-fixed-fee contracts are some of the material discussed.

An independent study of the economic aspects of atomic power has now been completed by the Cowles Commission for Economic Research (University of Chicago). The work analyzes the probable effects of atomic power on an industry-by-industry basis. Included are the aluminum industry, the iron and steel industry, the industries producing phosphate fertilizers, cement, bricks, flat glass, chlorine and caustic soda, railroad transportation, and residential heating.

Civil atomic defense preparation by the U.S. will now include three, five-week courses for "qualified educators and technicians" in radiological monitoring techniques, the AEC stated last week. Additionally, a series of one week "teacher training courses" will be given members of the medical profession, in the medical hazards of atomic warfare. Both courses will be sponsored by the AEC.

Providing a possible precedent for lawsuits involving ionizing radiation is the recent Rakowski v. Raybestos-Manhattan, Inc., N.J. Superior Court, Appellate Div., No. A-189-48, decided in favor of R-M. Rakowski, an X-ray fluoroscopic operator, claimed negligence by R-M had caused her physiological injuries, from her work. It was alleged R-M had not conformed to the standard practice in the industry in the installation of the fluoroscopic apparatus, and in the construction of the two rooms for its operation. It was also claimed that its subsequent operation had not conformed to that degree of care commensurate with its potential danger. R-M however, satisfied the court that it had followed usual trade and code stipulations.

With the interest in scintillation counters (whose sensitivity to gamma radiation has interested medical users) stimulated by demands for detection instruments which will allow radioisotope diagnostic dosages to be at a minimum, use has been made of anthracene for phosphor material. A "scintillation grade" anthracene, recently put on the market by Reilly Tar and Chemical Co., has been used at the University of Rochester to grow crystals 2½-in. in diamater by 4-in. long. Crystal counters have been cut from these. Some crystals are also being produced commercially by Harshaw Chemical Co.

Subscription rates: United States, U.S. possessions, and Canada, $18.00 a year. Latin America, $20.00 a year. All other countries, $25.00 a year.

SPECIAL REPORT

Highlights from INDUSTRIAL and SAFETY PROBLEMS of NUCLEAR TECHNOLOGY; a conference held in New York, Jan. 10th, 11th, and 12th, 1950 by New York University, in cooperation with the AEC.

INDUSTRIAL APPLICATIONS OF RADIOACTIVE ISOTOPES- Such applications fall into two classes, Dr. Charles Rosenblum, head, radioactivity laboratory, Merck & Co., Inc., explained to the conference. Firstly, there are the industrial instruments which depend specifically on the ionizing and penetrating power of radioelements: static eliminators, gauges, markers, and process control equipment. Here, the chemical nature of the radioelements is immaterial. The second category involves "tracer" or indicator uses, with the chemical nature of the radioelements being the important consideration. Cited were some examples of tracer use in industry:
Rubber technology; determining the source of sulfur in neoprene rubber.
The petroleum industry; studying lead tetraethyl absorprtion.
Metallurgy; investigating phosphorous distribution between molten iron and slag; and the solubility of calcium in steel.
Textiles; for rayon lubricant investigations.
Foods; iodate decomposition in bread, and absorption measurements in flour have been studied.

INSURANCE AND HAZARDS OF RADIOACTIVITY- These hazards must be controlled in their earliest phases, by both the atomic energy industry, and radioisotope and radiation equipment users, J. Dewey Dorsett, Association of Casualty and Surety Companies warned the conference. Unless this is done, he said, unsatisfactory experience will be reflected in large insurance premiums. Workmens' compensation rates can be kept down by remote control devices, protective guards, shields, well-planned monitoring programs, and proper medical examinations of exposed personnel. Public liability coverage is affected by how radioactive waste disposal, either stack effluent, or sewage, is handled. Products liability protection involves keeping radioactive material out of finished products, and especially consumer goods. Boiler and machinery insurance involves the possibility of radioactive contamination of boiler tubes, and other accessories, through contact with radioactive-bearing fluids, while machinery may be contaminated through failure of mechanical remote control devices, or faulty shielding.

ADAPTING THE STANDARD LABORATORY TO HANDLE RADIOACTIVE MATERIALS- Here, the future needs of the laboratory, as well as its present requirements, should be considered, Mr. Thomas Lanahan, engineer in charge of special laboratory design, S. Blickman, Inc., told the conference. Surfaces that lend themselves readily to decontamination (stainless steel, etc.) are of especial importance. Attention should be paid to well-chosen equipment; proper ventilation; recessed and sealed lighting; and drains and filtering means. The dry-box, in which radiochemical operations may be performed by the investigator wearing rubber gloves inserted through sealed ports, allows a flexibility for certain work, Mr. Lanahan noted.

RADIOACTIVE WASTE DISPOSAL PROBLEMS OF THE ATOMIC ENERGY INDUSTRY- These problems are similar to those of analogous industries, Dr. Abel Wolman, Johns Hopkins University, and Mr. Arthur E. Gorman, AEC, declared in a joint presentation to the conference. Gaseous, solid, and/or liquid contamination can arise from the operation of a chain-reacting pile, in producing plutonium, in making radioisotopes, for the production of power, or for experimental purposes. The amount and nature, and the effect of such materials upon the air, receiving bodies of water, and plants and animals, has made the disposal of radioactive wastes one of the most important confronting the industry. Now, the objective of the AEC is to get as near zero output of radioactivity as possible.

INJURIES FROM IONIZING RADIATION- Such injuries are characterized by a latent period, or delay, in their manifestation, Dr. G. Failla, Columbia University, told the conference. In the protection problem, he said, primary concern is with injuries that may not become apparent for perhaps 25 or more years. This protection involves the measurement of the radiation received by the critical tissues, which, in whole body irradiation may be the blood forming organs; ingestion, or inhalation of radioactive materials can further complicate the problem.

AT THE ATOMIC CITIES & CENTERS IN THE UNITED STATES...

OAK RIDGE, Tennessee- Natural gas has now displaced coal as fuel for the K-25 electrical power plant here, with the recent successful completion of the 164-mile, 22-inch pipeline from Greenbrier, N.C., to Oak Ridge. In addition to K-25, the gaseous diffusion, uranium-235 producer plant, the gas will shortly be available for the smaller generating stations which serve the Y-12 electromagnetic separation plant, and the Oak Ridge National Laboratory. (The AEC's gas purchase contract, signed in June, 1948, with the East Tennessee Natural Gas Company, calls for purchase of up to 60,000,000 cu. feet of natural gas per day. Under repeated attacks in Washington, the $10 million pipeline was staunchly defended by the AEC as an alternate fuel supply means. Since K-25 is a continuous process, any interruption of power from lack of coal, the original power plant fuel, would be serious.)

Research activities of Oak Ridge National Laboratory (ORNL), and those at the Y-12 plant, will be merged Feb. 1st. Dr. Alvin M. Weinberg, now ORNL research director, will head the integrated program. Dr. C.E. Larson, superintendent of Y-12, will become the director of ORNL.

LOS ALAMOS, New Mexico- Both water and electrical power shortages threaten here. Constant expansion of the Scientific Laboratories, for whose people this community exists, is the main reason. Efforts to get more water, from wells proposed in the Valle Grande, have collided with water rights of the Jemez, Zia, and San Ysidro Indians, However, the AEC has suggested it will construct a storage system on the Jemez river for the Indians. As to the electrical power, now in short supply: The consumption is dangerously near the generating capacity. Priorities of the atomic laboratories and offices assure for them adequate capacity without interruption; a major power failure would chiefly affect residential areas. More electrical capacity will be available from the new steam power plant, for which contracts have already been let. Completion of the plant, to incorporate two 5,000 KW turbo generators, is estimated for late this year...For construction of a new 80-bed hospital at Los Alamos, estimated to cost from $2 to $3 million, bid invitation no. 291-50-46 has now been issued by the AEC here. The contract will probably be let late in March, and will go as a whole to one contractor.

SANDIA BASE, Albuquerque, New Mexico- With over $22 million let in contracts here during the calendar year of 1949, for basic construction alone, this base has experienced its greatest expansion since it was created early in 1946. At this 42 square mile atomic installation, shared by the military's Armed Forces Special Weapons Project, and the AEC's Sandia Laboratories (Western Electric operated), more than 75 contractors are building the approximately 20 prime projects started during 1949.

ARCO, Idaho- A three man Engineering Advisory Committee will consult with and advise the AEC's Idaho Falls Operations Office on planning and development work at the Reactor Testing Station, here at Arco. Chairman of the Committee is L. J. Sverdrup, president of Sverdrup & Parcel, Inc., consulting engineers of St. Louis, Mo. Other members are Dr. H. M. Crothers, Dean of Engineering, South Dakota State College, Brookings, S. D. and W. W. Horner, partner in Horner & Shifrin, also consulting engineers of St. Louis, Mo...Bids have been asked here (invitation no. AT-10-1-27) by the AEC's Idaho Falls Operations Office for the producing and delivering to stockpiles of concrete aggregates. Bid closing date is Jan. 25th.

BROOKHAVEN NATIONAL LABORATORY, Upton, New York- The 30,000 kilowatt, slow neutron nuclear reactor here, first to be built in the U.S. expressly as a tool for research, and originally scheduled for operation in the Fall of 1949, has not as yet been placed in use. Tests of its new type cooling system, under simulated operating conditions, had shown that the duct work would not stand up in operation. The necessary modifications, as well as the re-examination of the design and construction of the reactor (by H. K. Ferguson, engineering firm in charge of the reactor construction, and Babcock & Wilcox, consulting engineers) will increase the estimated cost of the reactor, and associated equipment, by 6½% over previous estimates, from $23,322,000.00 to $24,827,000.00.

PRODUCTS, PROCESSES & INSTRUMENTS...for nuclear work

Non-destructive testing uses of radium are now 25% above previous levels on a national basis, according to G. T. Taylor, vice-president of Radium Chemical Co., New York. Steel foundries, pipeline constructors, and power plant equipment makers, using radiography for standard inspection practice, are mainly responsible for this increase. Now, more than 200 foundries, as well as almost all of the larger high-pressure valve manufacturers, are using industrial radium in quality control procedures, Taylor declared.

An exposure meter for industrial radiography, using a multiplier photocell in conjunction with two different types of fluorescent screens, has been developed by Dighton and Herz at the Kodak Research Laboratories, Wealdstone, Middlesex (England). While similar to the exposure meter designed for medical radiography, it differs in that it covers a range of x-rays generated between 40 and 200 kVp. It can be used both for direct exposure and with an intensifying screen.

NEW INSTRUMENTS--from the manufacturers: NCA Geiger-Muller classroom radioactivity demonstrator. Disintegrations indicated by loud speaker, flashing light, and needle deflection on the rate meter. Built-in voltage supply is sufficient for either gamma; beta-gamma; or alpha, beta, gamma Geiger tubes.--Nucleonic Corporation of America, 497 Union St., Brooklyn 31, N. Y.

Model EMA-2B, hand and foot radioactivity monitor. Measures simultaneously the extent of beta and gamma contamination on hands and feet of those handling radioactive materials. When the individual stands on the foot position (of the instrument) and inserts his hands in cavities near the top of the device, indicator lights show red, yellow, or green, indicating his degree of contamination.--Scientific Instruments Div., Radio Corp. of America, Camden, N.J.

ATOMIC PATENT DIGEST...latest U.S. & British applications & grants...

Liberation of atomic energy. Brit. Pat. No. 633,339; complete specifications accepted by Brit. Pat. Off. Dec. 21st, 1949: to Centre National de la Recherche Scientifique.

Method and apparatus for producing neutrons, by accelerating deuterium ions. U.S. Pat. No. 2,489,436, issued Nov. 29th, 1949, and assigned to Collins Radio Co., Cedar Rapids, Iowa.

Light sensitive photographic elements for radiography, with a maximum light absorption in the 530 to 650 millimicron region of the spectrum. U. S. Pat. No. 2,489,662, issued Nov. 29th, 1949, and assigned to E. I. du Pont de Nemours & Co., Inc.

Radiation detecting apparatus. Incorporates a material transfer compartment, separated by a movable seal from the electrode chamber. U.S. Pat. No. 2,490,298, issued Dec. 6th, 1949, to A. Ghiorso and C. Gordon, and assigned to United States of America (USAEC).

Neutron detector, comprising two concentric metal tubes with a gaseous medium in the space intermediate the walls of the tubes. The gaseous medium has a low capture cross-section with respect to fast neutrons, and a high capture cross-section with respect to thermal energy neutrons. U.S. Pat. No. 2,491,220, issued Dec. 13th, 1949, to E. Segre, and C.E. Wiegand, and assigned to United States of America (USAEC).

Neutron detector, and process of preparing neutron-detecting media. A powdered radioactive chemical compound, spread onto a metal foil, is die pressed into a thin, flexible sheet. U.S. Pat. No. 2,491,320, issued Dec. 13th, 1949, to P.G. Koontz, and assigned to United States of America (USAEC).

Accelerator magnet structure. A laminated, magnetically conductive core and winding means, in an apparatus for the acceleration of charged particles in an orbital path. U.S. Pat. No. 2,491,345, issued Dec. 13th, 1949, and assigned to General Electric Co.

Cyclotron oscillator system, producing high velocity electrons traveling in orbital paths of increasing radius. U.S. Pat. No. 2,492,324, issued Dec. 27, 1949, and assigned to Collins Radio Co., Cedar Rapids, Iowa.

IONIZING RADIATION...investigations & notes...

Experiments with beta radiography using radioactive materials, conducted by T. Westermark, at the Royal Institute of Technology, Stockholm, Sweden, have shown very satisfactory results. Advantages were seen over x-rays, for many applications, since it requires but simple equipment and inexpensive apparatus. In the experiments, S-35, C-14, RaD & E, Sr-90, and Y-90, were used. (The S-35, C-14, and Sr-90 were obtained from the USAEC, at Oak Ridge, Tenn.) Specimens of different thicknesses were radiographed, using the radioactive material of appropriate penetrating power. Of various methods tried, the most satisfactory was to concentrate the beta source onto a small area, and to place the specimen, lying directly on the photographic emulsion, at a distance of 5 to 10-cm. from the source. Reduction of air pressure to 5-20 mm. of mercury was necessary in most instances.

Protein depletion, as it alters the susceptibility of rats to total body irradiation, has been investigated by F. L. Jennings, Department of Pathology, University of Chicago. The rats were kept on a depletion diet until they had lost 25% of their starting weight, and then given total body irradiation with x-rays. For the protein-depleted animals (as against normally nourished, and similarly irradiated controls) the mortality was considerably greater at any given dosage than in the controls; most of the deaths occurred below 625 r. There were few deaths in the controls below this dosage. Age or weight, in the normally nourished rats, in the 150 to 280 g. weight range, was found to have little effect on their susceptibility to radiation.

Potato tubers, of the Katahdin variety, have been subjected to x-radiation at dosages varying from 75 to 2400 r, in experiments at Brookhaven National Laboratory, L.I. A. H. Sparrow, and E. Christensen, of Brookhaven, found that seeds from tubers irradiated with 150 and 300 r showed much higher percentage and faster germination, than seeds from plants grown from untreated tubers.

In other plant investigations, three agricultural experiment stations have reported negative results from experiments begun in 1948 to determine whether low-level radioactivity has any beneficial effect upon plant growth or quality. This confirmed earlier findings that radioactive materials would be of no benefit to the farmer, so far as crop growth were concerned (AEN 3/30/49 p. 3.).

The conversion of a projected million volt x-ray therapy room, into a radioactive cobalt (cobalt-60) therapy room, has been accomplished at the Francis Delafield Hospital in New York. Special apparatus was designed in the physics laboratory of the Department of Hospitals, City of New York, to provide the necessary shielding and remotely operated beam control, for handling the cobalt-60.

RADIOISOTOPES...latest tracer applications...

The rate of exchange of radioactive gases in the extremities (hands and feet), of young male subjects has been investigated by C. A. Tobias, H. B. Jones, J. H. Lawrence, and J. G. Hamilton, of the University of California, Berkeley. Objectives were to study the uptake and elimination of krypton and other inert gases by the human body. The results obtained have led the workers to suggest that the radioactive gases argon, krypton, and xenon have applications in the study of the circulation to the extremities, in the living patient, and in numerous problems of gas exchange. (Instrumentation notes: Prior to uptake measurements, the radioactive gases were introduced into a closed circuit spirometer. A Geiger-Muller counter was used to check the concentration of gas in the spirometer. In counting, the patient held a counter, gently, in one hand, surrounded by a lead shield, and the left knee was placed on a lead slit, limiting the solid angle of measurement for another counter.)

Sincerely,

The Staff,
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